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CALCULUS.

116. Proposed by M. E. GRABER, A. B., Tutor in Mathematics, Heidelberg University, Tiffin, Ohio.

Find the curve the length of whose arc measured from a given point is a mean proportional between the ordinate and twice the abscissa.

117. Proposed by WM. FRED FLEMING, Chicago, Ill.

A tin watering-pot is constructed by joining the frustums of two right cones, so that their intersection is a mathematical one, their axes meeting at an angle of 45° . The bases of the smaller frustum are 2 inches and 4 inches in diameter, its altitude 8 inches. The bases of the larger frustum are 10 inches and 12 inches in diameter, its altitude 15 inches. In joining the two frustums the edges of the two larger bases are brought into coincidence. Water is poured into the vessel until it begins to run out of the spout. How many gallons (231 cubic inches) are required? How much water is in the spout and how much in the can? The vessel is tilted forward (in the plane of the axes of the two frustums) sufficiently to allow one-half of the water to run out. How much of the liquid is left in the spout and can, and what is the area of the surface of the water in spout and can? Through what angle has the vessel been tilted?

*** Solutions of these problems should be sent to J. M. Colaw not later than Dec. 10.

MECHANICS.

126. Proposed by W. J. GREENSTREET, Editor of the Mathematical Gazette, Stroud, London, England.

AB is the horizontal base of a smooth cycloidal tube, vertex downward. A sphere is placed in the tube at A , and when it reaches the vertex another sphere of different mass is placed in the tube at B . When and where do they meet, and find their velocity immediately after collision, the spheres being partially elastic.

127. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.

Develop the Fourier Series to represent the temperature of a circular wire of uniform cross-section, in which the temperatures of the four quadrants are in order $t, 2t, 3t, 4t$.

128. Proposed by M. E. GRABER, A. B., Heidelberg University, Tiffin, Ohio.

A particle is placed on the convex side of a smooth ellipse and is acted upon by two forces, F and F' , towards the foci, and a force, F'' , towards the center. Find the position of equilibrium.

129. Proposed by B. F. FINKEL, A.M., M.Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

Two spheres whose masses are M_1 and M_2 are a units apart, and attract each other with a force $= M_1 M_2 / a^2$. Find work done in carrying a unit mass from the center point between them a distance r in a direction θ with line of centers.

*** Solutions of these problems should be sent to B. F. Finkel not later than Dec. 10.

DIOPHANTINE ANALYSIS.

91 Proposed by L. C. WALKER, A.M., Assistant Professor of Mathematics, Leland Stanford Jr. University, Palo Alto, Cal.

Find the three least positive integral numbers whose sum, sum of their squares, and sum of their cubes shall each be rational squares.

92. Proposed by M. A. GRUBER, A. M., War Department, Washington, D. C.

Find the sides of integral right triangles when the difference of the legs is given.

*** Solutions of these problems should be sent to J. M. Colaw not later than Dec. 10.

AVERAGE AND PROBABILITY.

115. Proposed by L. C. WALKER, A. M., Assistant Professor of Mathematics, Leland Stanford Jr. University, Palo Alto, Cal.

Three points are at random within a given triangle. Find the chance that they will all lie on one side of some one line that can be drawn through the center of gravity of the triangle.

116. Proposed by the late ENOCH BEERY SEITZ,

The average area of the quadrilateral formed by joining four random points on the surface of a circle, radius a , is $\frac{4a^2}{3\pi}$.

*** Solutions of these problems should be sent to B. F. Finkel not later than Dec. 10.

MISCELLANEOUS.

117. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, Gloucestershire, England.

If $x\cos\alpha + y\cos\alpha = a\cos\theta + b\cos\varphi$, and $x\sin\alpha + b\sin\varphi = y\sin\alpha + a\sin\theta = \kappa$, find the maximum value of κ , and the values of x and y .

118. Proposed by O. W. ANTHONY, New York, N. Y.

If f is determined by the equation $f(\mu\nu) = f(\mu)f^{-1}(\nu) + f(\nu)f^{-1}(\mu)$, when f^{-1} is the inverse of f , show that $f[(2)^\mu] = \frac{k^\mu + 1}{2^{\mu+1}}$, where k is the constant.

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BOOKS AND PERIODICALS.

Annals of Mathematics. Published under the auspices of Harvard University. Second series, Vol. 2, No. 4. Price, \$2.00 per year in advance. Published in October, January, April, and July.

The July number of the current year contains the following articles: Concerning du Bois-Reymond's Two Relative Integrability Theorems, by Professor E. H. Moore; On a Theorem of Kinematics, by Dr. P. Saurel; The Collineations of Space which Transform a Non-Degenerate Quadratic Surface into Itself, by Dr. R. G. Wood; Note on Multiply Perfect Numbers, by Dr. J. Westlund; The Isoperimetrical Problem on Any Surface, by Mr. J. K. Whitmore; On a Surface of the Sixth Order which is Touched by the Axes of all Screws Reciprocal to Three Given Screws, by Professor E. W. Hyde; Note Sur l'évaluation d'une intégral définie, Par le Professor D. Sintsof. B. F. F.

The American Journal of Mathematics. Published under the auspices of the Johns Hopkins University and edited by Frank Morely with the coöperation of other mathematicians. Price, \$5.00 per year in advance.

The October number contains the following articles: Memoir on the Algebra of